INTERNATIONAL JOURNAL OF TECHNOLOGICAL EXPLORATION AND LEARNING (IJTEL)
www.ijtel.org

Review of Reducing Routing Overhead in Mobile Ad-Hoc Networks by a Neighbor Coverage-Based Algorithm

Vijay U. Patil
PG Scholar, ADCET, Ashta, Maharashtra, India

Prof. A. S. Tamboli
Professor, ADCET, Ashta, Maharashtra, India

***Abstract*— Mobile ad-hoc networks (MANETs) is collection of nodes, there exist frequent link breakages which show the way to frequent path failures and route discoveries. Broadcasting is a basic and useful data distribution device, in a route discovery. In that, we propose a neighbor coverage-based probabilistic rebroadcast protocol for reducing routing overhead in MANETs. Where a movable node blindly rebroadcasts the first received route request packets except it has a route to the destination, and thus it causes the broadcast tempest difficulty. In order of effectively take advantage of the neighbor coverage knowledge, we suggest a rebroadcast delay to determine the rebroadcast order, and then we can obtain the precise additional coverage ratio by sensing neighbor coverage knowledge. We also identify a connectivity factor to give the node density adaptation. By combine the additional coverage ratio and connectivity factor, we put a sensible rebroadcast probability. Our propose system combines the compensation of the neighbor coverage knowledge and the probabilistic mechanism, which can appreciably reduce the number of retransmissions so as to reduce the routing overhead, and can also improve the routing performance.**

Keywords- Mobile ad hoc networks; Neighbor Coverage; Network Connectivity; Probabilistic Rebroadcast; Routing Overhead.

I. INTRODUCTION

Mobile Ad-hoc NETworks (MANETs) consist of a collection of mobile nodes which can move freely. These nodes can be dynamically self-organized into arbitrary topology networks without a fixed infrastructure. One of the fundamental challenges of MANETs is the design of dynamic routing protocols with good performance and less overhead. Many routing protocols, such as Ad hoc On-demand Distance Vector Routing (AODV) [1] and Dynamic Source Routing (DSR) [2] have been proposed for MANETs. The above two protocols are on demand routing protocols, and they could improve the scalability of MANETs by limiting the routing overhead when a new route is requested [3].

However, due to node mobility in MANETs, frequent link breakages may lead to frequent path failures and route discoveries, which could increase the overhead of routing protocols and reduce the packet delivery ratio and increasing the end-to-end delay. Thus, reducing the routing overhead in route discovery is an essential problem. The conventional on demand routing protocols use flooding to discover a route. They broadcast a Route REQuest (RREQ) packet to the networks, and the broadcasting induces excessive redundant retransmissions of RREQ packet and causes the broadcast storm problem, which leads to a considerable number of packet collisions, especially in dense networks. Therefore, it is indispensable to optimize this broadcasting mechanism. Some methods have been proposed to optimize the broadcast problem in MANETs.

MANET is a special type of wireless mobile network in which mobile hosts can communicate without any aid of established infrastructure and can be deployed for many applications such as battlefield, disaster relief and rescue, etc. In a MANET, in particular, due to host mobility, broadcastings can be applied to many areas, such as paging a particular host, sending an alarm signal, and finding a route to a particular host, etc. If there is link failure then device all re-broadcast request to all other node to find the destination. Many routing protocols, such as Ad hoc On-demand Distance Vector Routing (AODV) and Dynamic Source Routing (DSR) have been proposed for MANETs. The above two protocols are on-demand routing protocols, and they could improve the scalability of MANETs by limiting the routing overhead when a new route is requested. Due to node mobility in MANETs, repeated connection breakages might direct to regular path failures and route discovery, which could raise the overhead of routing protocols and decrease the packet deliverance ratio and increase the end delay [6]. Thus, reducing the routing overhead in route discovery is an essential problem.

The main contributions of this paper are as follows:

1. We propose a novel scheme to calculate the rebroadcast delay. The rebroadcast delay is to determine the forwarding order. The node which has more common neighbors with the previous node has the lower delay. If this node rebroadcasts a packet, then more common neighbors will know this fact. Therefore, this rebroadcast delay enables the information that

the nodes have transmitted the packet spread to more neighbors, which is the key to success for the proposed scheme.

2. We also propose a novel scheme to calculate the rebroadcast probability. The scheme considers the information about the uncovered neighbors (UCN), connectivity metric and local node density to calculate the rebroadcast probability. The rebroadcast probability is composed of two parts:

a. Additional coverage ratio, which is the ratio of the number of nodes that should be covered by a single broadcast to the total number of neighbors; and

b. Connectivity factor, which reflects the relationship of network connectivity and the number of neighbors of a given node.

II. MOTIVATION

The initial motivation of our protocol: Since limiting the number of rebroadcasts can effectively optimize the broadcasting, and the neighbor knowledge methods perform better than the area-based ones and the probability-based ones, then we propose a neighbor coverage-based probabilistic rebroadcast (NCPR) protocol. Therefore,

1. In order to effectively exploit the neighbor coverage knowledge, we need a novel rebroadcast delay to determine the rebroadcast order, and then we can obtain a more accurate additional coverage ratio,

2. In order to keep the network connectivity and reduce the redundant retransmissions, we need a metric named connectivity factor to determine how many neighbors should receive the RREQ packet. After that, by combining the additional coverage ratio and the connectivity factor, we introduce a rebroadcast probability, which can be used to reduce the number of rebroadcasts of the RREQ packet, to improve the routing performance.

III. LITERATURE REVIEW

Xin Ming Zhang et al [1] show that the probabilistic rebroadcast protocol based on neighbor coverage to reduce the routing overhead in MANETs. This neighbor coverage knowledge includes additional coverage ratio and connectivity factor. A new scheme is to dynamically calculate the rebroadcast delay, which is used to determine the forwarding order and more effectively exploit the neighbor coverage knowledge. Simulation results show that the proposed protocol generates less rebroadcast traffic than the flooding and some other optimized scheme in literatures. C. Perkins et al [2] Shows that the Ad hoc On-Demand Distance Vector (AODV) routing protocol is intended for use by mobile nodes in an ad hoc network. It offers quick adaptation to dynamic link conditions, low processing and memory overhead, low network utilization, and determines unicast routes to destinations within the ad hoc network. It uses destination sequence numbers to ensure loop freedom at all times, avoiding problems associated with classical distance vector protocols.

The Ad hoc On-Demand Distance Vector (AODV) algorithm enables dynamic, self-starting, multihop routing between participating mobile nodes wishing to establish and maintain an ad hoc network. AODV allows mobile nodes to obtain routes quickly for new destinations. AODV allows mobile nodes to respond to link breakages and changes in network topology in a timely manner. The destination sequence number is created by the destination to be included along with any route information it sends to requesting nodes.

- Broadcast

Broadcasting means transmitting to the IP Limited Broadcast address, 255.255.255.255. A broadcast packet may not be blindly forwarded, but broadcasting is useful to enable dissemination of AODV messages throughout the ad hoc network.

- Destination

An IP address to which data packets are to be transmitted. Same as "destination node". A node knows it is the destination node for a typical data packet when its address appears in the appropriate field of the IP header.

H AlAmri et al [3] shows that new routing protocol for Ad hoc networks, called on demand Tree-based Routing Protocol (OTRP). This protocol combines the idea of hop-by-hop routing such as AODV with an efficient route discovery algorithm called Tree-based Optimized Flooding (TOF) to improve scalability of Ad hoc networks when there is no previous knowledge about the destination. To achieve this in OTRP, route discovery overheads are minimized by selectively flooding the network through a limited set of nodes, referred to as branching-nodes.

In that Simulation techniques are used.

The theoretical analysis and simulation results showed that OTRP out performs AODV, and it reduces overheads as number of nodes and traffic increase. The simulation results for OTRP, AODV, with different number of nodes and 30 data traffic flows. Generally, as pause time and nodes density increase the End-to- End Delay. Z. J. Haas et al [4] many ad hoc routing protocols are based on some variant of flooding. Despite various optimizations of flooding, many routing messages are propagated unnecessarily. We propose a gossiping-based approach, where each node forwards a message with some probability, to reduce the overhead of the routing protocols. Gossiping exhibits bimodal behavior in sufficiently large networks: in some executions, the gossip dies out quickly and hardly any node gets the message; in the remaining executions, a substantial fraction of the nodes gets the message. The fraction of executions in which most nodes get the message depends on the gossiping probability and the topology of the network. In the networks we have considered, using gossiping probability between 0.6 and 0.8 suffices to ensure that almost every node gets the message in almost every execution. For large networks, this simple gossiping protocol uses up to 35% fewer messages than flooding, with improved performance. Gossiping can also be combined with various optimizations of flooding to yield further benefits.

In that Simulation techniques are used.

Simulations show that adding gossiping to AODV results in significant performance improvement, even in networks as small as 150 nodes. This result suggests that the improvement should be even more significant in larger networks. B Williams & T Camp [5] had discussed the Network wide broadcasting in Mobile Ad Hoc Networks provides important control and route establishment functionality for a number of unicast and

multicast protocols. Considering its wide use as a building block for other network layer protocols, the MANET community needs to standardize a single methodology that efficiently delivers a packet from one node to all other network nodes. Despite a considerable number of proposed broadcasting schemes, no comprehensive comparative analysis has been previously done. This method provides such analysis by classifying existing broadcasting schemes into categories and simulating a subset of each category, thus supplying a condensed but comprehensive side by side comparison. The simulations are designed to pinpoint, in each category, specific failures to network conditions that are relevant to MANETs, e.g., bandwidth congestion and dynamic topologies.

The categorized broadcasting protocols into four classes: “simple flooding, probability-based methods, area based methods, and neighbor knowledge methods.” For the above four classes of broadcasting protocols, they showed that an increase in the number of nodes in a static network will degrade the performance of the probability based and area-based methods

Performance evaluation of broadcast protocols shows the

- Increasing node count in a static network disproportionately hurts the Probability Based and Area Based schemes in terms of number of rebroadcasting nodes.
- The Neighbor Knowledge methods that do not use local information to determine hether to rebroadcast have difficulty in mobile environments; outdated 2-hop neighbor knowledge corrupts the determination of next-hop rebroadcasting nodes.

IV. PROPOSED SYSTEM

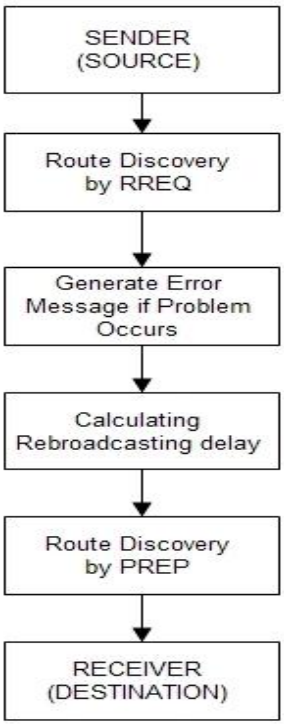

Figure 1. System Architecture

A. *Objective:*

- To Implementation of Route discovery by RREQ
- To Calculating Failure detection by Error
- To Calculating rebroadcasting delay
- To Implementing of Route recovery by RREQ and RREP
- Experimented Analysis of Route Discovery

B. *Route discovery by RREQ*

Route Discovery is used each time a source node needs a route to a target node. Initially, the resource node looks up its route cache to find out if it already contains a route to the target. Initially all nodes are collecting the data about neighbor nodes. The network monitors having the detailed information of neighbor nodes such as routing table. It provides the connection information to Route manager.

C. *Failure detection by Error*

The network monitors only provide the information about node details. Channel analyzer collecting detail about channel capability. If there is any problem with link channel then node will generate error message for inform about failure

D. *Calculating rebroadcasting delay*

When a neighbor receives an RREQ packet, it could calculate the rebroadcast delay according to the neighbor list in the RREQ packet and its own neighbor list. The rebroadcast possibility would be low when the amount of neighbor nodes is large which means host is in dense region. The probability will be large when the amount of nearby nodes is small which means source is in sparse region. We are considering the duplicate packet while transferring the RREQ. So we can avoid the overhead in rebroadcasting.

E. *Route recovery by RREQ and RREP*

In this module the signal handoff is done with the knowledge of route plan. (RREP) The route manager informs the channel fading. Because of less redundant rebroadcast, the protocol mitigates the network collision and contention, so as to increase the packet delivery ratio and decrease the average end-to-end delay. It shows that the proposed protocol has good performance when the network is in high density or the traffic is in heavy load.

V. ALGORITHM DESCRIPTION

Our algorithm is described in the following steps:

1. When node receives an RREQ packet from its previous node, it can use the neighbor list in the RREQ packet to estimate how many its neighbors have not been covered by the RREQ packet from previous node.
2. If node has more neighbors uncovered by the RREQ packet from previous node, which means that if node rebroadcasts the RREQ packet, the RREQ packet can reach more additional neighbor nodes.
3. When a neighbor receives an RREQ packet, it could calculate the rebroadcast delay according to the neighbor list in the RREQ packet and its own neighbor list.
4. After determining the rebroadcast delay, the node can set its own timer.
5. If node receives a duplicate RREQ packet from its neighbor node, it knows that how many its neighbors have been covered by the RREQ packet from neighbor node. Thus,

node could further adjust its UCN set according to the neighbor list in the RREQ packet from neighbor node.

6. After adjusting the Uncovered Neighbors set, the RREQ packet received from node is discarded.

7. When the timer of the rebroadcast delay of node expires, the node obtains the final UCN set. The nodes belonging to the final UCN set are the nodes that need to receive and process the RREQ packet.

8. Calculate the additional coverage ratio which is the ratio of the number of nodes that are additionally covered by this rebroadcast to the total number of neighbors of node.

9. Calculate connectivity factor which is the ratio of the number of nodes that need to receive the RREQ packet to the total number of neighbors of node.

10. Combining the additional coverage ratio and connectivity factor, we obtain the rebroadcast probability of node.

VI. EXPERMENTS AND RESULTS

In this paper, we have Study different papers to relate on Reducing Routing Overhead in Mobile Ad-Hoc Networks by a Neighbor Coverage. We can compare our results on Route Discovery Performance with Varied Number of Nodes, Varied Number of CBR Connections and Varied Random Packet Loss Rate.

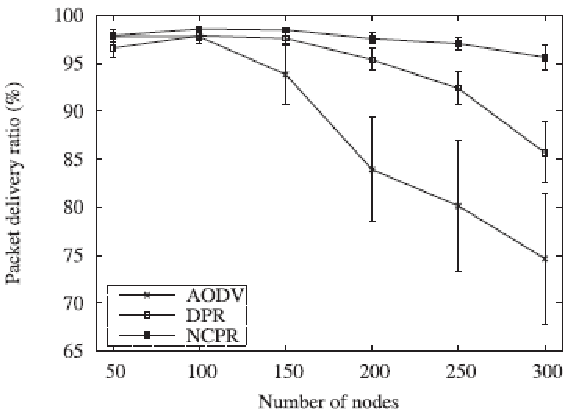

Figure 2. Packet delivery ratio with varied number of nodes.

Figure shows the packet delivery ratio with increasing network density. The NCPR protocol can increase the packet delivery ratio because it significantly reduces the number of collisions.

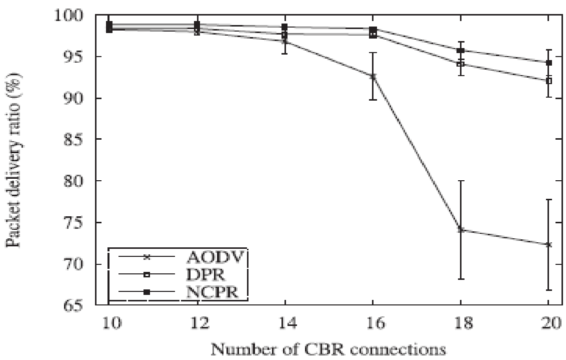

Figure 3. Packet delivery ratio with varied number of CBR connections.

Figure shows the packet delivery ratio with increasing traffic load. As the traffic load increases, the packet drops of the onventional AODV protocol without any optimization for redundant rebroadcast are more severe. Both the DPR and NCPR protocols increase the packet delivery ratio compared to the conventional AODV protocol because both of them ignificantly reduce the number of collisions and then reduce the number of packet drops caused by collisions.

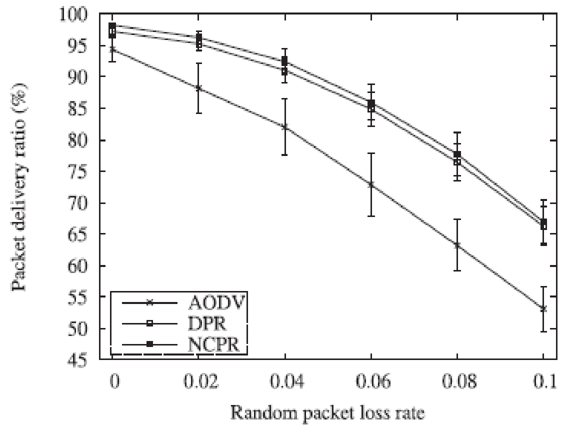

Figure 4. Packet delivery ratio with varied random packet loss rate.

Figure shows the packet delivery ratio with increasing packet loss rate. As the packet loss rate increases, the packet drops of all the three routing protocols will increase. Therefore, all the packet delivery ratios of the three protocols increase as packet loss rate increases. Both the DPR and NCPR protocols do not exploit any robustness mechanism for packet loss, but both of them can reduce the redundant rebroadcast, so as to reduce the packet drops caused by collision.

REFERENCES

[1] Xin Ming Zhang, En BoWang, Jing Jing Xia, and Dan Keun Sung, "A Neighbor Coverage-Based Probabilistic Rebroadcast for Reducing Routing Overhead in Mobile Ad Hoc Networks,"IEEE TRANSACTIONS ON MOBILE COMPUTING, VOL. 12, NO. 3, MARCH 2013.

[2] C. Perkins, E. Belding-Royer and S. Das,"Ad Hoc On-Demand Distance Vector (AODV) Routing," IETF RFC 3561, 2003.

[3] H. AlAamri, M. Abolhasan and T.Wysocki, "On Optimising Route Discovery in Absence of Previous Route Information in MANETs," Proc. IEEE Vehicular Technology Conf. (VTC), pp. 1-5, SC12, 2009.

[4] Z. Haas, J.Y. Halpern, and L. Li, "Gossip-Based Ad Hoc Routing, "Proc. IEEE INFOCOM, vol. 21, pp. 1707-1716, 2002.

[5] B. Williams and T. Camp, "Comparison of Broadcasting Techniques for Mobile Ad Hoc Networks," Proc. ACM MobiHoc, pp. 194-205, 2002.

[6] X. Wu, H.R. Sadjadpour, and J.J. Garcia-Luna-Aceves,"RoutingOverhead as a unction of Node Mobility: Modeling Framework and Implications on Proactive Routing," Proc. IEEE Int'l Conf. Mobile Ad Hoc and Sensor Systems (MASS '07), pp.1-9, 2007.

[7] S.Y. Ni, Y.C. Tseng, Y.S. Chen, and J.P. Sheu, "The Broadcast Storm Problem in a Mobile Ad Hoc Network," Proc. ACM/IEEE MobiCom, pp. 151-162, 1999.

[8] A. Mohammed, M. Ould-Khaoua, L.M. Mackenzie, C. Perkins, and J.D. Abdulai, Probabilistic Counter-Based Route Discovery for Mobile Ad Hoc Networks," Proc. Int'l Conf. Wireless Comm. And Mobile Computing: Connecting the World Wirelessly (IWCMC '09), pp. 1335-1339, 2009.